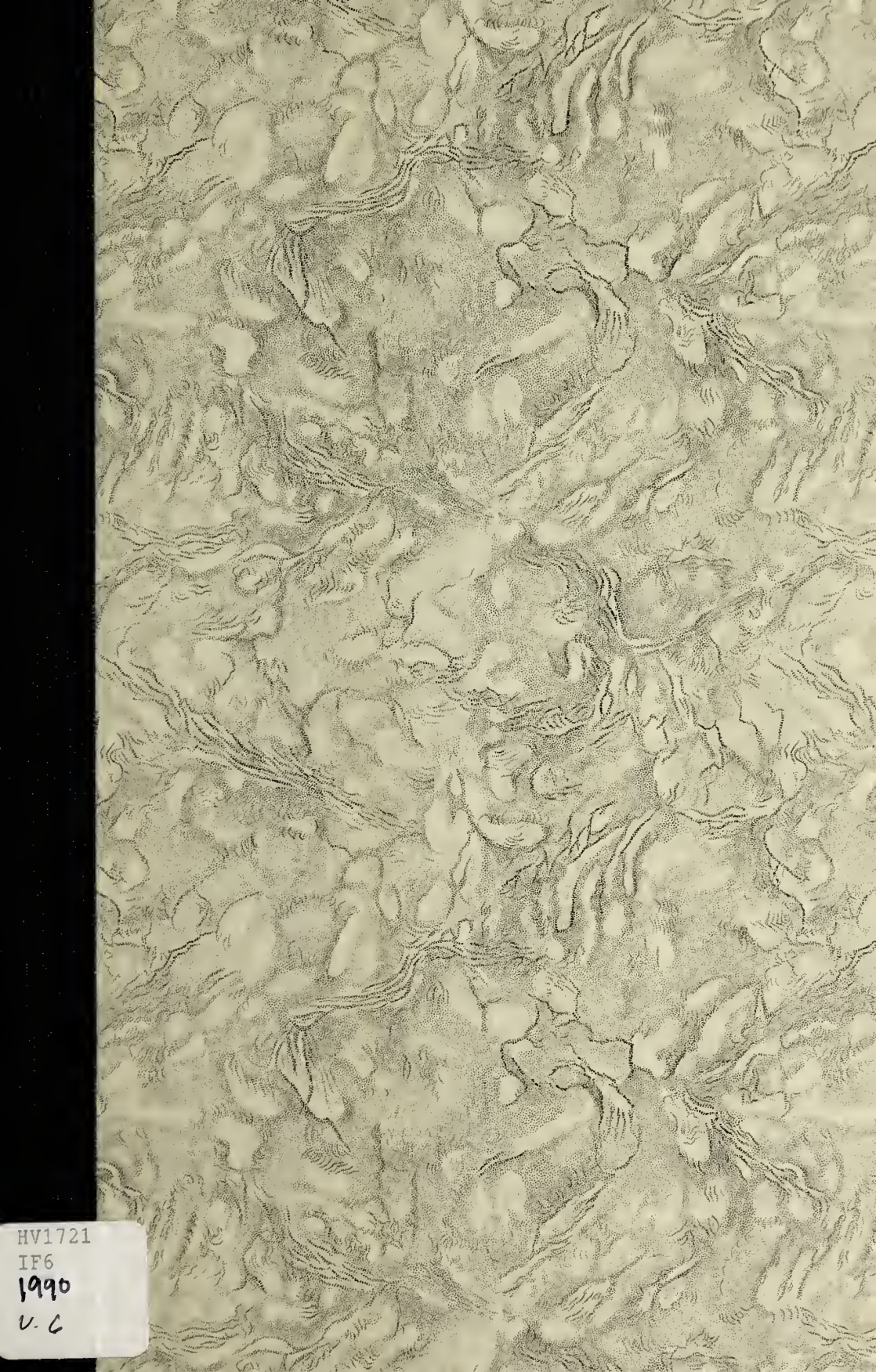

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BOOKLET 6

DIVISION OF MANAGEMENT AND TECHNOLOGY

SECTION OF INFORMATION TECHNOLOGY

Session 138 Wednesday 22 August 08:30–11:00

Distributed Intelligence in Library Systems: Prospects and Problems (13-INF-1-E)	S. Michael Malinconico, School of Library and Information Studies, University of Alabama, Tuscaloosa, Alabama, USA
Library Cooperation based on Information Technology Networks: a Vision for a European Library Future (45-INF-2-E)	Morten Hein, Danish National Library Authority, Copenhagen, Denmark
The new PICA Library Network (46-INF-3-E)	Look Costers, PICA, Leiden, Netherlands

SECTION OF STATISTICS

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A Plan of Action for collecting statistical Data on the Prices of Library Materials (15-STAT-2-E)	Frederick C. Lynden, Brown University Library, Providence, Rhode Island, USA
Harmonizing Library Statistics from different Countries: a Nordic adaptation of the International Standard for International Library Statistics (ISO 2789) (14-STAT-1-E)	Ivar A.L. Hoel, Royal School of Librarianship, Copenhagen, Denmark

AUDIOVISUAL MEDIA JOINT WITH EDUCATION AND TRAINING. ROUND TABLE

Session 109 Tuesday 21 August 09:00–11:30

Training for audiovisual Archivists and Librarians (23-AVM 1/TRAIN-3-E)	James Turner, University of Toronto, Toronto, Canada

gotab Stockholm 1990

Distributed Intelligence in Library Systems: Prospects and Problems

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Abstract
The architecture of modern, third generation computers is already highly distributed. The performance of modern computers could not be achieved otherwise. In this paper we argue for the extension of these techniques to application systems. Six principal advantages of distributed computing are discussed: (1) enhanced performance which is a result of similtaneous processing, (2) improved cost/performance characteristics, (3) greater flexibility in accommodating increases in workload, (4) increased likelihood of matching user requirements and system capabilities, (5) simpler upgrade path, and (6) simpler systems development and maintenance. There are a number of approaches to the development of distributed systems: (1) distributing processing capability for a single function among a number of different computing devices and (2) using independent systems that perform either a single function or a limited number of multiple functions to perform a complex activity. Many successful examples of the former already exist. There are fewer examples of the latter, however, herein lies the greatest potential for improved system performance. A number of impediments to the realization of distributed systems for library applications are identified. However, it is shown that these impediments are rapidly being surmounted and that there are already a number of successful systems that employ various kinds of distributed computing architectures.

Introduction
Modern computing systems seem to perform several tasks at the same time. However, this is only an illusion. Conventional computers with a single processor, of necessity, only execute one instruction at a time. The impression of performing multiple, simultaneous tasks is created by using the spare milliseconds the computer's central processing unit remains idle whenever it performs relatively slow input or output functions.

This is accomplished with the aid of specialized hardware and software. Third generation computers have enough intelligence built into their input/output channels and device controllers that their central processors are able to initiate input/output operations and turn over responsibility for completing them to specialized circuitry built into their channels. Thus, the central processor is able to disengage while these operations are in progress. Input/output channels and device controllers found in third generation computers are in fact special purpose computers which operate in parallel with the central processing unit. They permit aspects of a computing task to be distributed among various physical components of a computing system.

Likewise, modern, intelligent VDT terminals allow data to be extensively manipulated before being transmitted to a central computer – consider, for example, the buffers and the insert and delete features which are relatively common on most VDT terminals today. Consider also the extensive processing which takes place in the control units of direct access

storage devices: these devices, which would have passed for powerful computers less than two decades ago, queue read and write requests, monitor the positions of the disks' read/write heads and execute I/O requests in the order which minimizes the time needed to process them by dispatching those nearest the read/write heads first.

These are relatively commonplace features of contemporary computing systems. They are successful examples of distributed computing system architectures. We can cite other examples, such as the intelligence built into bar code readers, which permits them to decode the alternating light and dark bars and to deliver digitally encoded characters to a computer, or the extensive processing done by laser printers which permits them to create output in a wide variety of typestyles and typesizes. The rapidly decreasing cost of computing equipment has permitted increasing amount of processing ability, or intelligence to be moved from the central processing facility to various external devices, thus, freeing the costly central processing facility for more productive work. Third generation computing systems are already highly distributed. The performance and cost effectiveness of these systems is directly attributable to this design feature.

Advantages to distributed computing

The general idea behind distributed computing is to employ a configuration of independent, specially adapted devices to perform a complex task. There are several advantages to this: First, if various processing tasks can be executed simultaneously, the performance of a system can be substantially improved. Second, by employing highly specialized processing units for frequently occurring tasks the cost/performance characteristics of a computing system can be improved. Third, a system consisting of multiple devices can be more easily configured to accommodate increases in workload. Fourth, a system configured from a number of independent units makes it easier to match a user's requirements with a system's capabilites. Fifth, system upgrades are easier to make. And, sixth, systems development and maintenance can be simplified.

I. Simultaneous computing

The ability to execute a number of tasks or functions simultaneously is a clear advantage of distributed processing systems. There are two immediate applicatons of this capability: (1) to expedite multiple, similar transactions, and (2) to expedite the processing of single, complex transactions. The former is the most common situation in library applications. It includes systems that perform relatively little processing on very large numbers of online transactions. Their objective is to dispatch each of the transactions they receive as rapidly as possible. At times of very high activity, if only a single processor is available, some transactions must wait in a queue until the processor is free. Clearly, if more than one processor were employed, the probability that a transaction can be initiated immediately upon arriving at the computer is substantially increased. This technique, known as parallel processing, is employed by several commerical, local library systems, e.g., UTLAS's T Series systems and CLSI's Sequent-based parallel processing systems.

The advantages of parallel processing are considerable. We can show mathematically that a parallel configuration of two processors is more responsive than a single processor with twice the processing capability, that three processors operating in parallel are more responsive than a single processor which is three times as powerful, etc. (see figure 1).

Parallel computing is one of the most effective and simplest forms of distributed computing. Most of the work is one by the computer's operating system. It assumes responsibility for finding a free processor to deal with new transactions as they are received by the system.

The second type of distributed computing includes distributing aspects of a processing task

among different computing devices. The simplest example is illustrated by the following arithmetic problem:

Sum = 338.67X456.67 + 2.71828X3.14159625 + 458X12.

This sum can be computed by performing in turn each of the multiplications and then adding the results to an accumulator. The time to compute the result is the sum of the times to perform each of the individual operations. If instead, a parallel processing computer is used, and if the problem is appropriately divided among the invididual processing units, each of the intermediate products could be computed by different processors all operating at the same time. The time to perform all of the multiplications would then be equal to the time to peform the longest one, *not the time to perform all three.*

Admittedly, there are no practial examples of this sort of distributed processing among library applications yet, although there have been some experimental information retrieval systems which employ such techniques. The most likely use of this technique will come with the application of artifical intelligence techniques and expert systems to library problems.

II. Cost-effective computing configuration

Another application of distributed computing is the use of inexpensive, special-purpose computing devices to reduce the processing load on large, general purpose computing systems. One of the earliest examples of this type of distributed computing in a liabrary application was Stanford University's use in the 1970s of a minicomputer as a front-end processor to a large mainframe computer.[1] The front-end device was used to format records for display and to edit input data for obvious errors before passing them on to the mainframe processing system. In this way the mainframe was relieved of the processing overhead associated with validating input data. System responsiveness was improved in two ways: (1) when there was a problem with an input record, the minicomputer was able to respond more quickly than the mainframe, which was also used for Stanford University's other processing activities; and (2) since the transaction traffic reaching the mainframe was reduced, all users enjoyed greater responsiveness.

This is also an example of simultaneous processing. While the mainframe processes valid transactions, the front-end minicomputer is free to validate another input record.

A very important example of this kind of distributed computing is OCLC's processing system. OCLC's online system employs a configuration of 121 interconnected computers. Fifty eight front-end and telecommunications computers are used to manage the network, 48 computers are used to access the data base and the remainder are used to perform the actual bibliographic processing.[2]

III. Handle increasing processing load

If a system can be configured in a way that permits a number of computers to share the processing load, and if load sharing is handled by the operating system or by hardware, then it should be possible to add more computers when the transaction load warrants without the need to alter application software. This can be particularly important for automated library systems. Unlike commercial organizations, libraries do not have any easy way to amortize investments made in technology. Thus, library systems generally have a considerably longer life than commercial systems, hence, must accommodate a wider range of operating conditions.

It is usually difficult to anticipate precisely what the processing load will be several years after a system is implemented. The only certainty is that the transaction traffic will increase

and that it will be greater than was anticipated. Thus, library managers are faced with a most unhappy dilemma. If they underestimate the future transaction load, the systems they choose may need to be replaced before their costs have been fully justified. If, on the other hand, they overestimate the transaction load, the may buy more computing capacity than is needed and waste resources that way. If a library acquires a distributed system that is designed to operate an multiple processing units and if the transaction volume is greater than had been anticipated or the system is not as responsive as had been expected, it can simply add more processors to the configuration, thus, protecting any investments already made in computing hardware.

IV. Match user recquirements and configuration capability

Perhaps the greatest advantage to a distributed system is the freedom and flexibility it permits. If a system can be configured from a variety of individual components each of which have been optimized to perform a single function or a limited number of related functions, a library has a far better chance of obtaining a system with the functional, performance and cost characteristics it wants.

Libraries pretty much perform the same functions in similar ways. Nonetheless, there are important differences in the way those functions are performed and differences in the relative importance of each of those funcions. For example, an academic library may order materials from a large variety of sources, may maintain a variety of approval plans, may need to maintain lists of purchase desiderata, and may need to prevent duplicate purchases of costly items, hence, it may be primarily concerned with exercising sophisticated control over the ordering process; a public libary, on the other hand, may need to acquire many copies of a limited number of titles, but needs to allocate their costs to a great many different units and funds, hence, it may be principally concerned with the efficenty of the clerical procedures associated with acquisitions. One could also conceive of differences even emong libraries of the same type. We could extend this analysis to include the different requirements different types of libraries have, for example, for serials control and ordering, loans control, public catalog access, access to specialized internal and external data bases, etc. Thus, it is extremely unlikely that any single multipurpose system would match even moderately well the requirements of very many libraries.

Clearly, the most advantageous solution is a system which is configured from a number of *interoperable* components. This flexibility already exists at the hardware level. We need to insist that it be extended upward to the application software level.

V. Ease of system upgrades

Regrettably, most vendors will resist this sort of an approach. Those that have a major share of the market are unwilling to risk losing market share to others by making it easy for libraries to buy different products that can be interconnected with theirs. This, however, is actually a short-sighted view, as these vendors are ignoring a potentially large market for incremental upgrades of existing systems. It is clearly more difficult for libraries to obtain funding for, and to justify, large, comprehensive systems, than relatively small, limited purpose systems. If vendors were to concentrate on developing a number of relatively limited function systems with standardized interfaces, they would have more frequent opportunities to sell their products, and libraries would be able to upgrade their systems more frequently.

VI. Simpler system development

As we have argued elsewhere, problems of interface standards aside, it is easier to develop and maintain a distributed, integrated system than a *monolithic integrated system,* i.e., a

comprehensive multifunction system.[3] The reasons are that each component of the system is completely isolated from all others, thus, development and system maintenance can proceed without concern for interference with other parts of the system.

Disadvantages

There are a number of self-evident disadvantages to a distributed processing system. The most obvious of which is the lack of fully-developed standards necessary to support the linkage of systems produced and supported by different vendors. The problems would be formidable if we were dealing only with systems yet to be developed, but in fact we must contend with systems which were initially developed some time ago, at a time when efficient use of computer hardware was more important than sound software engineering and conformity with standards. These systems and future versions of them will be with us for some time to come. If we are to link systems, we must be prepared to deal with problems arising from interfacing systems that employ different computing equipment, operating systems, applications software, programming languages, file structures, command languages, file access methods, etc.[4]

Vendors, wishing to develop open systems, must be prepared to deal with a longer learning curve while their software engineers master the intricacies of designing systems with flexible, standard interfaces while still providing an appropriate level of functionality. For many of them this might spell the difference between financial success and insolvensy.

Conclusion

However, the situation is by no means entirely bleak. Much of the suite of standards which comprises the OSI reference model has been developed and demonstrated in practice. The LC, OCLC, RLIN Linked Systems Project has demonstrated the efficacy of these standards for linking large-scale computer systems.[5] Geac has demonstrated the use of these standards to transfer records between RLIN and New York Univesity's local system.[6] And, the Irving Library Network in Colorado under a contract with Minicomputer Systems Inc. has developed a highly successful system which links systems of 5 different vendors in Colorado and 3 other vendors for a consortium of libraries in Florida. The Irving system was developed in less than 1 1/2 years.[7] Admittedly, it does not in all respects employ open system standards, nonetheless, it is a functioning system which was brought to fruition in a relatively short period of time.

There has also been other significant work on the development of standards which will facilitate the interconnection of systems. Much of this work has been a consequence of the Linked Systems Project. An information retrieval standard NISO Z39.50 has been developed.[8] An ISO equivalent has also been developed. And, general agreement has been reached on a common command language standard for formulating data base queries, NISO Z39.58.[9]

Thus, the prospects for distributed or linked systems is well within our reach. In order to realize the benefits of open and distributed systems, the library community must strenuously urge the automated systems vendors to invest the additional effort that is needed to develop such systems and should encourage these efforts by giving the vendors that develop them preference in requests for tender.

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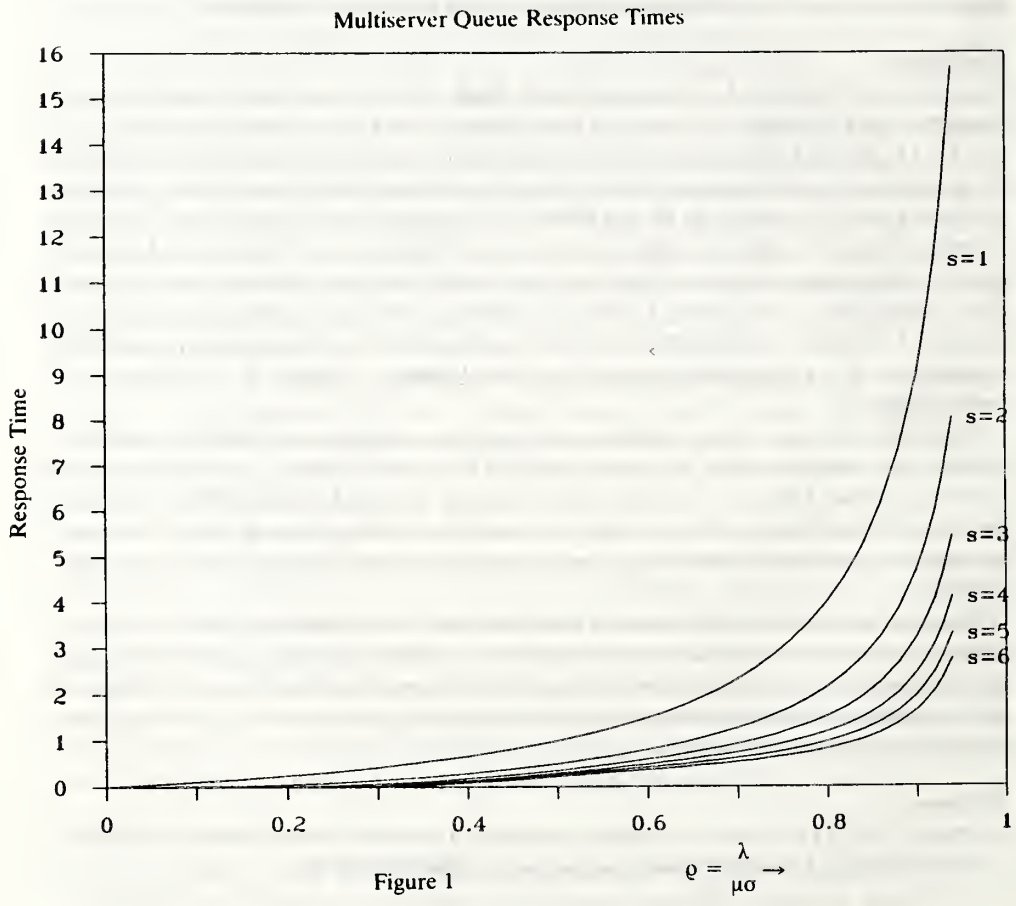

Figure 1

Library Cooperation based on Information Technology Networks
A vision for a European library future

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Abstract
This paper describes information technology in libraries as a function of a professional scenario and not as a discipline of its own. With the present planning for library cooperation in Europe as a starting point a number of elements are described and discussed. The author's point of view is that the increasing demand for information which will force the library community to increase cooperation to seek cost effective solutions.

Introduction
For the past few years – and certainly in the future – information technology has brought many new possibilities. These will be empty systems and empty carriers. They will only be meaningful, if a content is defined according to our present and future needs.

This makes an obligation for a dialogue between a certain field of application and a particular technology. Without a dialogue ending in a conclusion combining professional needs for an application and the technological possibilities many solutions will appear and bring damage both to the professional and to the technology based reputation.

We will all have to be careful. We shall not buy empty solutions, but define our needs and purposes and then choose the technology to serve our demands.

The professional dream
Our professional dream in libraries is to serve our users. We know that their demands are increasing with a speed our limited resources cannot cope with. We have to renew our approaches and methods.

Our scope and biggest problem is to identify wanted information and provide that information for the user. For 2 decades computer systems have been at our hand and much has improved. But most solutions are isolated and the integration in search for information has not appeared. At least not in Europe.

One of the most promising elements in the dream is the interest for libraries that has emerged in the European Community. Libraries outside that particular small area of the world do not necessarily understand this. But the very much divided Europe – library wise – has got a new approach in improving services for the users by this interest.

It is not my purpose here to explain the present European plans for libraries, but they will come and they will be very much technology based. Perhaps because technology could be considered as an innocent element – or because technology based solutions are the only solutions to create new patterns in cooperation among European libraries.

Our present patterns are based on two elements: The dominance of English language and the dominance of Anglo-American library automation.

A Dane wanting information on Italian issues from a Danish library will at first be presented with English language information in a North American database.

This Danish scholar is fully capable in Italian and the libraries are only providing 2nd rank information to his needs. We do not have trans-European language systems for information and literature retrieval. And that is what we need.

And if we find information we also need methodologies to bring this information into our library in an original or in a surrogate form.

So simple, nothing more.

Structures in technology

Most libraries using automated procedures belong to a network with other libraries. Some libraries use stand-alone systems, but they will often be either very small – or so big, that they themselves have the size of a network.

Network can either be very centralized, like the North American utilities. But they can also be a number of almost stand-alone systems tied together.

The shape of a network can vary very much. In small countries there is a tendency towards nationwide networks. In bigger countries they could be regional or based on unpredictable patterns in cooperation.

Apart from the networks there are resource databases in national bibliographies or pools of foreign bibliographic data. They can be integrated or on their own.

The typical situation is that a library wishes access to a number of layers: The information in the local library, the local group of libraries, the partners in the network, connected general databases – and then the rest of the world.

This provides a multitude of possibilities, some of them are in fact non-existing due to lack of tools in cooperation and lack of networks of a more general nature to interface this very pluralistic situation.

The technology element

More and more libraries have their holdings in a computer system either alone or together with other libraries. They can be depending on their own original cataloguing. But most systems will rely on information resources from outside, mainly the national bibliographies. Most national bibliographies in Europe are available in machine readable form. They are used nationally. But who else mounts the Danish national bibliography in their system? We have our own in our systems plus what has appeared from British Library and Library of Congress in the past 10 years. It is not enough. Where is the Italian, the German, the Portuguese, the etc national bibliography in my system? I can not even go online to them. And this prevents me from doing obvious things in serving the users' needs.

One could say that the users are raising their demands too much – but they are not. They come with their problems. It is our duty to serve and provide.

And even if I had a line to your system I would not understand your system. It would not be your fault. You would not understand mine, either. We could start writing interfaces between the two of us. But we would soon end frustrated in the wish to connect to the large variety of systems around.

This problem is not ours isolated. Most people working with computers and cooperation have learned this lesson. Therefore people in other areas – with much more money than we have – have invented a solution. This is called OPEN SYSTEMS INTERCONNECTIONS or more simple OSI. OSI is a reference model for interworking with computers from all types of environments.

Even if the title of this paper suggests a fair element of technology this is not a paper on OSI, but takes it for granted that your computer can interwork with another computer from

a different manufacturer even if your data are stored differently from the data in the other system.

OSI will create a transparent connection. You will use a foreign target system on the conditions of your own practise and your own system. The target system will observe your request as if it came from one of the local users. The network conventions take care of the differences.

OSI is a set of conventions or standards made by CCITT and ISO/IEC, the standardization bodies in telecommunication and information technology. The basic part is an X.25 network, the packet switching connection. The standards on top of that enables the computers to negotiate on which terms they will communicate. The reference model is described in 7 layers. The top one is the applications layer. The rest is made by somebody else. The library and information world have only to concentrate on the specific applications for our needs. In real life an OSI connection will consist of a computer in each end, both with their local area network with connected workstations, an X.25 network in between and front-end program that connects the computers to the network according to the standards.

A lot of work is going on in this field. At first we had the LSP project, the Linked Systems Project in USA among the Library of Congress and the utilities. In Canada some experience had been gained, too. Some experimental work has also been carried out in the Nordic countries, particulary in Norway.

The issue has been raised in ISO TC46, the Technical Committee §46 that deals with information and libraries in the International Standardization Organization. 4 protocols for Search and Retrieval and for Inter-Library Loans have been internationally approved as draft proposals and will be presented as draft international standards this year.

As the library program in progress in the Euorpean Community considers communication throughout Europe as an important issue further progress is coming soon. EWOS, The European Workshop On Open Systems, is working with a study mandate on this issue for libraries sponsored by the Commission of the European Communities. This could lead to a European standards profile for the library area. On the experimental level a project sponsored by the European Commission is in progress. The project shall deal with inter-library loans between the United Kingdom, France and the Netherlands.

Wheather this carrier will be empty – and of little use – or an important advancement in librarianship is up to the definitions to be created in the library community concerning usage and definitions.

Areas of cooperation

How can we cooperate to improve services? The question contains two elements: The professional policy attitudes (to be described later) and pin-pointing elements in actual cooperation.

Libraries are information. Therefore we need access to knowledge and references to knowledge. In most cases in the near future this will mean databases with bibliographic information. In the medium term future a much higher element of actual information will be needed in databases.

A logic step – having a reference – is the wish to obtain the actual information, in other words, interlibrary loans and document delivery.

Improvement in document delivery is a necessity if we shall not be frustrated with all our references that cannot be obtained. In the discussion we must split up in delivery of original documents and documents in surrogate forms.

We shall also improve our cooperation in bibliographic resource sharing. The MARC format was invented 25 years ago, but even today the actual amount of cooperation is rather low. This must be a clear indication of the waste of resources and that library budgets are not as low as often indicated. Can we afford to live isolated?

A reliable network in data exchange based on national bibliographies is essential for better cooperation. As for the past a vast number of retrospective cataloguing projects can be expected in the coming years. They ought to be interconnected too.

And cooperation is not only between libraries. It is also integration with other resource centres, but also to vendors and suppliers. A fruitful cooperation between national bibliographies, publishers, booksellers (and their equivalents for the non-book media) and libraries on information exchange on technology based methods will also be a major achievement.

To summarize cooperation:
* On knowledge and information
* On inter-library loans
* In document delivery
  - original documents
  - documents in surrogate forms
* On bibliographic data in the household
  - sharing national bibliographies
  - sharing retrospective data
* Relation to vendors and producers

Predictions and assumptions

Even if everyone agrees to the benefit of cooperation they have little experience in cooperation. Cooperation exists in close environments here and there in Europe. But most libraries believe they are on their own and do not need the help from somebody else. We have fine examples of scholarly cooperation but not in cooperation on practical issues. If we talk of trans-border activities it is even worse.

Libraries have too little knowledge in usage of already existing resource centres. And the many resource centres do not promote themselves sufficiently. Even with the present level in technology cooperation and usage could be much higher.

Libraries are not important in the general society. This is of course a contradiction to our own opinions. Therefore the national infrastructure for libraries may vary from country to country, but seldom to show examples of stable or streamlined infrastructures. That is a problem for the future when library cooperation will become more and more international. A clear-cut domestic situation makes it easier to go international.

We are always tempted to make centralized solutions. It seems to be easier, but centralization has a very high demand on formal infrastructure. This is seldom achieved on an international level. At the same time the nature of the technologies to come has the ability to overview and interwork in a very decentralized way.

A short list of immediate demands

We should all collect knowledge on circumstances in our own country and in other countries, thereby being better able to contribute to an extended cooperation.

Cooperation will create a demand for more uniformity in national bibliographies. We should have an immediate understanding of the quality of a foreign product when it comes into our hands. We should know the coverage, the depths in registration and the promptness in appearance.

Cooperation will also demand a higher understanding of the resources available. If we all go to the national library in one particular country in a typical hierachy form, that library could have its potential resources worn out by intensive usage. In a non-hierachy form work load and usage could be distributed. One of the lessons learned in the North American utilit-

ies is that many libraries do not know that the library community has a wealth in their collections for mutual benefit.

Surveys and studies to identify important collections should be promoted and the result should appear in a common meta database so that we know where to address ourselves. An example of this can be seen in the work with a register of European microform masters (EROMM). This could be a common resource on information of printed material converted into microform.

This is necessary as it will last many years before a significant amount of library catalogues have been converted into databases. And the one European database of library holdings must be a monster that will not emerge.

Even if a single European concept cannot be achieved – it should actually be avoided – there are many reasons to stimulate cooperation by intensifying efforts in standardization. This can be done – and shall be done – in a double strategy: By intensifying European participation in ISO standardization in the area of generic standards for libraries – and by starting a European library standardization on the application level through CEN/CENELEC, the European bodies for standardization. It is among other issues necessary to bridge the incompatibility in bibliographic formats. They are all more or less alike. The present differences are caused by narrow minds when the formats were chosen. In my opinion we could choose any format as long as we choose the same.

And then I come to COPYRIGHT and protectionism. If we fence our systems with copyright issues or pricing mechanisms there will not be much cooperation. As the work load in cooperation will differ from country to country and from system to system there will be need for a balancing mechanism. The only one applicable will be payment for services. We need some mutual principles we can all agree to. E.g. we shall not try to cover our basic costs by having an extra income for export activities. This issue should be settled.

We need some estimates on the amount of cooperation. If cooperation can be estimated to be very high, there could be a need for some instruments not needed on a more modest level of cooperation. Up to a certain level cooperation can be administered by 3 types of national institutions in a loose international concept: The national bibliographies, the national document supply centres and the national centres for information systems. One or more in each country. If cooperation comes above that level there will be a need for super national institutions, but they could be made as additions to existing national centres.

Is that information technology?

The price for library automation is coming down. Everyone can act as a database host. In the beginning of library automation the costs were so high that centralization and guidance was an obvious choice. To day the price for doing things is so little that there is no natural incitament in the technology to seek common solutions or common goals. It is tempting to buy a cheap solution that brings you out in the middle of nowhere at a modest cost to the supplier but with very little perspective in long term considerations.

The present interest in decentralization in any sector in the society points in the same direction.

We have to admit that the bulk of the workload in any library is dealing with information that exists on the premises and that information systems first of all shall cope with that problem. But even to do so it is necessary with cooperation to be cost effective. But beyond this job there is an increasing demand for information to be found elsewhere. The libraries are not isolated islands.

The amount of computing and of information technology will increase and so will the need for cooperation. The technology will be offered to us. We only have to choose and pick.

Nobody will offer ready made solutions in cooperation. That is our business and our responsibility.

That is why technology is more about strategies and policies than about electronics.

The New Pica Library Network

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Abstract
In this contribution an overview is given of the new developments of the Pica Library Network which are being undertaken and which aim at the further integration of both local and central library functions.

The use and possibilities of the emerging Research Networks is explained and the merging of the physical Pica Network into the Dutch Research Network SURFnet is discussed.

In addition an approach is explained for the implementation of a new application area especially concerning the exchange of documents in electronic form.

The Royal Library and the major Dutch University Libraries, together Pica's member libraries, and the Central Organisation for Public Libraries, the larger Public and Town Libraries and an ever increasing number of smaller research and special libraries are participating in the Pica-activities.

Pica started initially by providing central services to its libraries.

The first facility which became available in 1978 was the shared cataloguing system which is now being used by more than 120 libraries. In addition the system is used by the Royal Library to catalogue and produce the Dutch National Bibliography containing over 30,000 new titles a year.

The shared cataloguing system supports the participating libraries in cataloguing their collections in an efficient way while at the same time a computerized central catalogue is being built in which the documents of all participating libraries have been described.

The second central facility, the automated Union Catalogue and Interlibrary Loan System, became available in 1983. This facility builds on the database which results from the shared cataloguing activity and serves now some 300 libraries.

In addition to these two major central services Pica supports facilities for electronic mail and acts as a host system for information retrieval databases.

Apart from central services Pica also developed a Local Library System initially for its member libraries, but later on also for other research libraries.

The first version of this system was installed in 1984.

Thus far, the central services were provided to the participating libraries through a star-shaped terminal-to-computer network and the communication with the Local Library Systems was provided through a weekly update of the Local Library Catalogue from the central database by means of magnetic tape.

During the last part of the eighties it became more and more clear that a star-shaped terminal-to-computer network would not be an adequate answer to future requirements and that a grid-shaped computer-to-computer network, which gives a much greater flexibility in communication, would be required.

Pica realized that it is of strategic importance for the future of library cooperation to follow the rapid developments in the area of technical networks and computer interconnection and to make these advanced network facilities available to its libraries in order to enhance the

integration of local and central functions.

In order to achieve this it was recognized that it is essential to combine the now existing components such as the central services, the local library systems and the network into one fully integrated library network. Users of such a network will be able to use the network functions in such a way that it is of no importance to them which processor on which database in the network is servicing them.

A complicating factor in this is, however, that for libraries participating in the Pica activities there can be basically one of three situations.

a. A library can use the Pica central services and have no Local Library System.

b. A library can use both Pica's central services and the Pica Local Library System.

c. A library can use Pica's central services and use a commercial, non-Pica Local Library System.

As Pica wants to accomodate all three situations, it was decided that the central system will be redesigned in such a way that it will act as a central server. This central server will consist of a new and efficient search engine which will be used for all central functions, such as Cataloguing, Interlibrary Loan and Retrieval functions.

In addition the central server will accomodate functions such as update, display, validations, entering ILL requests, maintenance and other functions which can be used by the user of the systems in a more or less random fashion as long as that user is authorized.

This means that in the new so called Pica3 system the user will not be locked into one application (i.e. Cataloguing) anymore but in principle will be able to search a title and then do all kind of operations on that title. These operations could be cataloguing operations or ILL operations or retrieval operations, and this new concept will enormously enhance the flexibility of Pica's central services which will make it possible for users to use sequences of functions according to their requirements.

In order to support both the a and b type users (libraries without local library systems and libraries with a Pica Local Library System) it was decided that the central server (the Pica3 system) will be connected with the outside world through a functional protocol.

As the ISO-developments are going too slow and as the functionality of the OSI bibliographic protocols is not rich enough, Pica decided to develop its own proprietory bibliographic protocol modelled according to the OSI-protocols; the Pica3-protocol.

This gives the added advantage to be able to make changes and extensions to the protocol if and when required, so that the progress of further development of the Pica-network is not hindered.

Activitation of the central server functions by using a functional protocol has the advantage that these central functions can be activated from within a local application. In this way it is feasible to mix acquisition and cataloguing functions, circulation and interlibrary loan functions, cataloguing and OPAC functions, etc.

The result is full integration of local and central applications, but in order to achieve this also the Pica Local Library System has to be redesigned.

There were several other reasons for redesigning the Pica Local Library System.

Some of these are:

- The requirement for enduser connectivity through the University Local Area Networks (LAN's)
- The requirement for improved OPAC funtionality
- The requirement for the use of a commercially available RDMS
- The requirement for more flexibility
- The wish for hardware independance

The new Pica Local Library System will be based on the client-server concept.

The server and client machines which together comprize the LBS3 system will be connected through an Ethernet-LAN and work together on the basis of the Pica3 protocol. The client machines will consist of powerful PC's and will contain a large part of the online circulation control, the acquisitions and the serials control functions. They will use the local servers in the LBS3 network such as the local database server, the print server, the X.25 server and the application server as needed.

The X.25 server will give access to the remote central server for searching, cataloguing and ILL and retrieval functions, and will also give access to other local library systems connected through the network.

The applications server will especially take care of OPAC functions for dumb terminals as well as for client machines and will also take care of offline tasks.

The application server will also take care of a continuous update process which will maintain synchronization between the central and local databases in a virtual realtime fashion. The results of cataloguing will be immediately available in the local database.

Not all users in the Pica-network will have Pica Local Library Systems and for these users Pica has designed a PC-based workstation which can communicate with the central Pica3 server using the Pica3 protocol and communicates with the user through a graphic interface.

The workstation will take care of a limited number of functions such as formatting and editing, but in the future it is foreseen that more functions will migrate into the workstation.

The Central Pica3 system, the Local Library Systems and the workstations have to be connected through a so called Wide Area Network.

Till very recently Pica has employed its own leased line network which was essentially a star-shaped terminal network although we have been using X.25 communication protocols since 1983.

As the development and maintenance of the basic physical network consisting of telephone lines, modems and switching equipment is an increasingly complex matter, Pica has decided to seek close cooperation with the Dutch Research Network SURFnet.

SURFnet is set up by the Dutch government and the Universities and is participating in the initiatives of the European Commission for a European Research Network.

Pica has just signed a contract with SURFnet and as of January 1st 1990 the physical Pica-network is being integrated in the physical datacommunication infrastructure of SURFNET.

This ensures the availability of advanced, highspeed network environment, providing links with other European research networks, which can be used as a basis for the next level of networking, the international level.

In addition to the development of a proprietory Pica3 protocol Pica will as a second line of development implement a number of general standard OSI-protocols such as Virtual Terminal Protocol (VTP), File Transfer (FTAM) and electronic mail (X.400) which will make the functions within the Pica network accessible for users of non-Pica systems.

It is clear that the users of these non-Pica Local Library Systems will much less profit from integration than the users of the Pica LBS3 system.

This can unfortunately not be avoided and may possibly cause some future problems.

As a third line of development Pica will support the Bibliographic OSI-protocols which are now under development, i.e. Inter Library Loan (ILL) and Search Retrieve (SR). These OSI-protocols will especially be used for international cooperation. In relation to this it is important to mention that LASER in the UK, SDB/SUNIST in France and Pica in the Netherlands have been awarded a contract from the European Commission for the development of an OSI Pilot/Demonstration project between library networks in Europe for interlending services.

The project will link the systems of the three organizations using standard X.400 protocols for electronic message handling and the bibliographic protocols which I mentioned before.

The project aims to achieve interconnection between the three computerized library networks in order to support and develop international interlending services in general. The project is one of the first European projects in the area of European library cooperation.

For the next years to come Pica sees it as its main challenge to develop and maintain advanced services in the area of document transmission both in electronic form and in enhanced traditional form. This way we will support our libraries in reating an electronic infrastructure for the delivery of documents in an efficient way to end-users.

In this new activity Pica will closely cooperate with the Royal Library and detailed plans are now being laid out.

It is important to note that Pica would like to use its existing network facilities for the transmission of electronic documents and has evaluated but rejected the use of group III fax equipment for this purpose.

This means that large volumes of data, in an order of magnitude of at least 10 times the existing volume, will have to be transmitted through the network. It is foreseen that the larger part of this data will be transported during the night and that sophisticated workstations will be employed fitted with flat-bed scanners and small laser printers.

As the electronic transmission of documents is not an isolated national problem, Pica is trying to get a number of larger organizations in the library field both in Europe and the USA, to agree on a de facto standard for an electronic document transmission format.

If this can be achieved it will not necessarily mean that all parties should use the same workstations, but at least compatibility would be ensured so that documents can be exchanged in electronic form between networks.

It is true that Pica is undertaking a huge effort in modernizing its systems and integrate these in the New Pica Library Network.

I hope that I will be able to report to you in another two years that this effort has been successfully completed.

A Plan of Action for Collecting Statistical Data on the Prices of Library Materials

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Abstract
Gives background and rationale for price indexes for library materials. Recommends libraries begin to collect international data on the prices of library materials. Suggests a plan of action which includes doing a survey of data currently available, promoting the collection of data, and involving the IFLA Section on Statistics in a program to publish such data. Encourages involvement of UNESCO, publishers, and vendors in the collection of such data.

Introduction
The issue of price indexes for library materials has been a persistent agenda item for the IFLA Section on Statistics. The Standing Committee on Statistics has heard presentations on this topic at IFLA on as many as five previous occasions: in 1972, 1973, 1974, 1977 and 1982. There has been a steady interest in price indexes because no system has yet been established to collect price data on library materials internationally. This year seems to be a propititious time to renew the call for a system of price indexes. *First*, the Standing Committee on Statistics is re-examining its role by looking at the future of library statistics. Statistics on the economics of libraries, particularly the cost of materials, merit attention. *Second*, the world is moving towards a period of greater influence for private enterprise and a competitive market economy. For example, in 1992, European nations will join together as one economic bloc. Hence, it is incumbent upon libraries to be measuring the changes in prices for library materials. *Third*, libraries in the world are still suffering the effects of differential pricing forced upon libraries as Rolf Griebel notes "by multinational publishing companies."[1] Libraries in the United States have suffered from extraordinary price increases for scientific and technical serials published by foreign companies. According to the American Association of Research Libraries (ARL) statistics;

> "from 1975/76 (when serial expenditures were first reported [by ARL] to 1987/88, the average cost per serial in the ARL university library has risen $21.54 to $75.18 or to 3 1/2 times its inital level... By any measure serial prices have increased remarkably. For historic perspective, the average subscription price paid by libraries during 1947–49 was $3.62. By 1960 the average price had increased to only $5.32."[2]

Fourth, there is now an international standard developed for the "determination of price indexes for books and serials purchased by libraries." The draft international standard is in the process of final approval and contains guidelines for both national price indexes and local cost indexes. *Finally*, it is crucial at this time for libraries to be able to counteract the trend towards more expensive materials with data which can be used to convince funding authorities of the needs for more monies and be used by libraries, acting as consumer groups, to persuade publishers to moderate their prices. Price indexes for library materials are important management tools which can be used by libraries everywhere in the world to measure

changes in the prices of books, serials, and other materials. Expenditures for collections make up a significant proportion of every library's budget.

Definition and purpose of price indexes for publications purchased by libraries

The International Organization for Standardization (ISO) Draft International Standard 9230 *Determination of Price Indexes for Books and Serials Purchased by Libraries* defines a price index as a "method of showing the relative change in the average price of library materials over an interval of time"[3] and further elaborates the definition using the American National Standards Institute description:

> A price index has a base period of one or more years, and the average price in the base period is assigned the index value of 100; the average price in succeeding years are divided by the base period average price and multiplied by 100 to give the price index for each year.[4]

Price indexes show trends in the movement of prices, and can be used by libraries for the following purposes: 1) to justify increases in the library's book budget; 2) to allocate the materials budget by subject categories; 3) to analyze cost trends and plan future budgets; 4) to aid librarians in interpreting collection program costs to funding authorities and 5) to determine the impact of material cost increases on other library programs.

In its budget justification, the Brown University Library uses the Price Index for Periodicals published by the American Library Association. According to this index, from 1977, the base year, to 1989 American periodical prices increased by nearly 250 percent, at an average annual increase of 10.9 percent while during the same period the Consumer Price Index went up 93.6 percent. Thus, periodicals increased in price 2 1/2 times the increase in the cost of living in the U.S. The average price increased from $24.59 to $85.37 or about 3 1/2 times, similar to the experience of ARL libraries, noted earlier.[5]

History & structure of price indexes

The first proposal for a price index for publications purchased by libraries was made in October 1955 by Wiliam H. Kurth, then Assistant Order Librarian at the Library of Congress. In his initial proposal, Kurth, "disturbed by sharp and alarming increases in the prices of books and periodicals issued throughout the world and lack of precise data on these price movements... recommended that an international series of price indexes be created."[6] His proposal resulted in the creation of price indexes for books and serials which have continued to this day in the United States. The book index has the following features: 1) national average price data compared with an index base period; 2) average price per volume; 3) subject breakdown of price data; and 4) price data for hardcover and paperback books. The periodical price index has the following features: 1) national average price data for periodicals compared with an index base period; 2) average price per title; 3) subject breakdown of price data; and 4) separate price data for serial services and periodicals. In the United States, the price indexes are produced and monitored by the American Library Association Library Materials Price Index Committee (LMPIC), a committee of the Association for Library Collections and Technical Services (formerly RTSD). This Committee has also created price indexes for non-print media; library produced microfilm; daily newspapers; and British and German books. The indexes are published in the *Bowker Annual Library and Book Trade Almanac* for the use of librarians.

There are also specialized indexes. U.S. academic librarians became dissatisfied with the hardcover book index because it did not reflect the prices of academic books, a sub-set of total publishing output. As early as 1974, a specialized price index for British academic books

was produced in England.[7] This index relied upon the price records of the *British National Bibliography* (BNB). The index was originally compiled at Cambridge University which is a depository library and automatically receives books reported in the *BNB* and keeps those considered to be of academic level. Since the U.S. had no such arrangement, vendor data from vendors who supplied academic libraries with books became the resource for the compilers of a U.S. academic book price index. Unfortunately, the *BNB* as primarily a bibliographic source dependent upon cataloging, began to fall behind in price data. Since 1986, the British Academic Books Price Index has also relied upon vendor data.[8] The German academic book price index also depends upon vendor data.[9] Finally, a very new index of Dutch academic book prices has been created through the efforts of a bookdealer.[10] Thus, the international vendor community is aiding U.S. and British libraries in providing price data for academic books.

The draft ISO Standard expands upon the experience of the American and British price indexes. Developed by Morten Hein, Denmark, and his ISO working group, it allows for two types of indexes: a national price index and a local cost index. The standard does not insist on separate indexes for paperback books and hardcover books. It uses UNESCO and ISO definitions as well as the 25 subject headings recommended by UNESCO. It permits a library to include not only periodicals, but all types of serials in the index so long as the producer of the index identifies what is contained in the index. The standard does not require that data be derived from national bibliographic agencies because it recognizes that vendor data can frequently be more up-to-date and accurate in terms of prices. In May 1989, the standard was approved for final balloting. Once approved, the existence of the standard will aid in the establishment of systematic gathering of price data which is both international and comparable. In previous addresses to IFLA groups, the standard was considered to be a pre-requisite to the collection of data on library materials prices. Therefore, one of the chief stumbling blocks to price statistics aggregation has disappeared.

Previous recommendations to IFLA

In an earlier presentation to IFLA, Mr. Kurth recommended that librarians of IFLA "base the work or place it in close conjunction with the national library association; maintain a continuing relationship with the publishers' association; and maintain liasion with the national statistical bureau responsible for the compilation and issuance of educational and publishing statistics."[11] He also urged that the IFLA Committee on Statistics perform an advisory role to libraries or organizations producing price indexes. Other speakers who have addressed IFLA on price indexes have advised additional steps. Ms. Doralyn Hickey suggested that once international statistics had been gathered agreement needed to be reached on "the proper type of publication for the resulting figures."[12] Ms. Jane Pulis agreed with previous speakers that "the international availability of price indexes for library materials... would be a potentially valuable element within the expanding network of international library statistics."[13] Finally, at an IFLA meeting in Montreal in 1982, I recommended the following steps: 1) "give publicity to the international standard, once completed, and encourage its use; 2) support the compilation and publication of price data, using the new international standard, by IFLA national libraries, in cooperation with their national publishing associations and national statistical bureaus, and the production of a directory of sources of price data for library materials in member countries; 3) promote the timely publication of price indexes by member countries through announcements in the *IFLA Journal* about new or forthcoming prices indexes for library materials' and 4) foster research by librarians of IFLA on price trends in member libraries by publishing studies in the *IFLA Journal*.[14] All of

the above proposals are still valid and are incorporated into this recommendation for the Stockholm general meeting.

Proposed plan of action

The first step towards implementing statistics on the prices of materials is to add economic statistics to the Medium Term Programme of the Section on Statistics. In particular, it is important to include price indexes for library materials in the Programme. In 1977, the Section on the Exchange of Publications offered the following resolution:

> IFLA is requested to take note of the Sections interest in book price indexes for various kinds of acquisition, to review their availability and relevance for the output of major publishing countries, and to take steps to have more complete, reliable, and prompt statistics made available.[15]

In the same year, Alexander Allardyce of the British Library urged that IFLA's Division of Collections and Services work on international coordination of price information. He noted:

> One of the most important practical fact-finding tasks now being carried on systematically in some countries and not in others is on book prices. IFLA has hitherto merely touched on it. It is now of far more than academic importance. Not only have book prices escalated through inflation, but in some countries information has been compounded by devaluation ... The librarian's presentation to administrative authorities has to depend more upon induction and persuasion than on general information. Modern fiscal management requires a higher ratio of fact to opinion, and so the need for external evidence is great.[16]

In November 1977, an Ad-hoc ISO group met with Dr. Karl Neubauer, later Chair of the Section on Statistics, to discuss price indexes. It was agreed that:

1) A price index for budgeting of libraries for resource allocation is necessary
2) A price index must be internationally compatible.[17]

Thus, there is a history of an IFLA interest in price indexes, and a strong rationale for including them in an IFLA programme.

The second step is to develop a questionnaire about current data available on the prices of publications published by libraries and present the findings of this questionnaire to the IFLA General Meeting in Moscow. A sample questionnaire is included in Appendix A to this paper. Initally, using UNESCO statistics, it is necessary to identify the major publishing countries and then to contact IFLA membership in those countries to request responses to this questionnaire. The principal goal will be to discover the best resources for price statistics, be they national libraries, national statistics bureaus, publishing associations, or vendors. The survey should determine the name(s) and address(es) of the organization(s) responsible for making available data on publishing on prices and production or collecting such data. The name of the publication and/or a contact person is also essential information. Next, it is important to discover what information is provided. For example is the following information provided: a) total volumes published; b) total cost of published volumes; c) average prices; d) subject breakdown; and e) format breakdown? (Different information would be necessary for different formats, such as serials, e.g., serial frequency, domestic rate, country of origin, etc.) It is also of value to find out the source of the price data if the source is different from the organization publishing the data. The questionnaire should also attempt to disclose what, if any, research is going on the prices of library materials in the country completing the survey. The survey should enable the Section on Statistics to establish the following: 1) if

there is a national price index in the respondent country; 2) if there is none, what sources might enable one to be created; and 3) some facts about the current costs of publications sold to libraries from the respondent country. The responses to the survey should allow the Section on Statistics to stay up-to-date on price changes in a country through the contact persons noted in the survey. The timetable for the questionnaire would be 1) approval at the Stockholm meeting; 2) mailing following the meeting; and 3) reporting of initial results at the Moscow meeting. By the New Delhi meeting it would be possible to report final results.

The third step towards establishing a worldwide system of price indexes for library materials is to compile and publish a directory of sources for price data from IFLA member countries. The directory would contain not only the names of experts from each country, but would also include organizational data and timetables for publication of price data. A directory could also be used to encourage the creation of price indexes where there are none. The directory could further serve as a source for data on publishing production in IFLA member countries. The production of this directory must be coordinated with the UNESCO Statistical Office. In 1982, the IFLA Section on Statistics recommended that Karl Hochgesand, Programme Specialist at the UNESCO Statistical Office, be contacted regarding the possibility of including average prices in the annual UNESCO Book Production Statistics. A proposal was written urging UNESCO to include price data in the Book Production Statistics. It was pointed out that price information can be good measure of the ability of the average citizen to obtain cultural materials as well as allowing comparisons with other educational materials. For example, is the average price of a book more or less expensive than the cost of admission to a movie?[18] Unfortunately, UNESCO was not able to include this information in its statistics gathering. Therefore, the IFLA Section on Statistics must attempt to assemble the data through its membership, and through its regional centres. It should keep UNESCO informed about its findings.

A fourth step will be to offer the expertise from IFLA members to organizations wishing to develop such indexes. First, experts from those countries which have regularly published price indexes should be listed in the above directory. Second, the Section on Statistics should contact the Price Index organizations in countries which publish indexes (or price data) and ask them to advise groups having difficulties in producing indexes. The American Library Materials Price Index Committee is curently seeking to obtain more price data on periodicals published in the major European countries. The Committee is asking vendors if the vendors can use their computerized databases for price data. The Committee prepared guidelines for the vendors to assist them in preparing data. At least three of the vendors have now expressed an interest in producing price indexes for periodicals. Finally, the Standing Committee on Statistics should regularly hear from a price index expert on the progress of the work going forward.

A fifth step is for IFLA to regularly publish statistical data on the prices of publications purchased by libraries. This type of information could be published in the IFLA Journal. The *Book Research Quarterly* in the United States regularly publishes a column called "Statistical Series" which reports U.S. book production statistics of the U.S. Department of Commerce.[19] Any such regular feature in the *IFLA Journal* should include reports on the broad scope of statistical series resulting from the Section on Statistics programme. Giving responsibility for regular reporting of price statistics to the *IFLA Journal* would fulfill the suggestion by Doralyn Hickey in her 1973 address to the IFLA section on Statistics.

Conclusion

The conditions are right for the establishment of an internatioanl series of book and periodical price indexes. An international standard for price indexes for publications purchased by libraries has been published and will shortly be approved. There is improved computerized control of cost data and better bibliographic control of the publishing output of nations of the world. With continuing support from the Section on Statistics it will be possible to create such a system. Once this has been done, libraries will have, as the ISO Standard notes, a tool for library management: "Use of price indexes is, of course, only one element in library management practice, but one which is nevertheless necessary for relevant budget control."[20]

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Questionnaire on price data for published materials purchased by libraries

Name and Title of Respondent _____

Library _____

Address _____

_____

Longer comments can go on the back of the questionnaire.

1. Does any national organization (national statistics bureau, publishers' association, or library association) publish national statistics on materials prices and production? Yes _____ No _____. If Yes, what is the name of the organization and its address? (If No, go to #9)

   _____

   _____

   _____

   _____

   If yes, what is (are) the title(s) of the publication?

   _____

   _____

   _____

2. What information is provided?

   a. Index of prices? _____

   b. Total volumes published? _____

   c. Total cost of published volumes? _____

   d. Average price _____

   e. Subject breakdown? (Please indicate classification system) _____

   _____

   f. Format breakdown? (e.g., paperback, microform, etc.) _____

   _____

   If convenient, yoo may supply a sample of the publication in lieu of answering the above questions.

3. What is the freequency of the publication containing price data? _____

   _____

4. If the source of data is different from the organization named in number one as the publisher, please give the name, address, and phone number of the other organization compiling the data.

   _____

   _____

   _____

5. How are the figures obtained (e.g., survey, through a national bibliography, vendor data, etc.)?

_____

_____

_____

6. What methodology was used to develop price data? (e.g., random sampling, comprehensive survey, weighting, etc.)

_____

_____

_____

7. Are there commercial firms in your country which publish information on the prices of library materials? Yes _____ No _____ If so, what are the names of the firms and their addresses?

_____

_____

_____

_____

8. If there are published price data on books and periodicals available for publications of your country, what uses are made of such data?

Budget justification for libraries _____
Analysis of publishing trends _____
Analysis of publishing industry _____
Analysis of inflationary trends _____
Other _____

9. Are you aware of any unpublished studies or on-going research in this area of librarianship? Yes _____ No _____ If you know of research on materials prices, please indicate the name of the researcher(s), the title of the study(ies), and where the study(ies) may be obtained:

_____

_____

10. If not named above, please name the national publisher's organization:

_____

_____

_____

11. Are you aware of any computerized data bases in your country which might provide materials price data? Yes _____ No _____ If there is such a data base, where is it located and what organization manages it?

_____

_____

_____

12. General Comments _____

_____

_____

_____

_____

_____

Data of Response _____

Please return this questionnaire before _____ to:

Mr. Frederick C. Lynden
Brown University Library
Box A
Providence, Rhode Island 02912
U.S.A.

Harmonizing Library Statistics from different Countries

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Abstract
The five Nordic countries have been working together with the purpose of harmonizing the yearly reported statistical data from their libraries. The work is based on the International Standard ISO 2789, International library statistics in its recently revised form, which is adapted for practical use in the libraries. Results achieved in the research libraries are discussed. Special problems were encountered and resolved concerning A) The type and number of libraries to be included form each country in each library category, so that they are comparable. B) The categorisation of the staff, since their educational backgrounds differ from country to country. C) Consensus on the categories of statistical data to be included in a multinational statistical yearbook. D) Consensus on the exact definition of these categories.

On the basis of solutions found to these and other questions, a Nordic "Master Questionnaire" and "Guide to the M.Q." was agreed upon. The Guide includes comprehensive definitions with corresponding examples. Using a definition of on-line search, additional data on information services are collected.

Nordic multi-national library statistics will be published, starting from 1988. The same fundamental data can now be used for the national, Nordic and internaional, i.e. UNESCO statistics, and the libraries only have to reply once. It is hoped that the Nordic work will be of inspiration to other groups of countries.

The five Nordic countries, Denmark, Finland, Iceland, Norway and Sweden, have for five years been working together with the purpose of harmonizing the yearly reported statistical data from their libraries. This has been done both for the public libraries and the research libraries. This paper deals only with the research libraries, for which the work was initiated and financed by NORDINFO.

The Draft International Standard ISO/DIS 2789 of 1988 with later amendments was a necessary but not sufficient basis for this harmonization. It needed a practical interpretation. In the future one may expect that a single set of figures from different Nordic libraries – such as for instance on the number of copies of original documents sent to foreign countries instead of original documents – appears as the result of all Nordic libraries using the same definition, the same understanding of the definition, and the same counting units applied in a consistent way.

The first data, from 1988, collected on this basis have in the last months been assembled and edited, and will later on be published. The experiences are promising and encouraging. The problems encountered when editing the data are smaller than could be expected. The data seem to be reliable and give a fair basis for comparisons between the countries. The 1989 data are expected to be even more complete and accurate, due to the libraries being more accustomed to the new procedures. It must be judged a success, bearing in mind that statistics never can give the complete picture.

It is probable that what has been done reaches the limits of possible harmonizing between

different countries. Two presuppositions have to be fulfilled in order to succeed. First, there must be a national agency responsible for collecting and presenting the statistical data. Secondly, both the agency and the libraries must have experience in collecting data on the level demanded by the UNESCO Recommendation and Questionnaire. Good results will ultimately depend on the determination to reach them – and that again depends on how necessary reliable and adequate statistical data are considered to be for library development.

The purpose was not to give more work to burdened librarians. But in some cases standardization and harmonization makes new counting procedures and habits necessary. Even more noticeable in the libraries was the fact that on the national level it had already been decided to improve statistics. This called for more data to be reported. Multi-national harmonization is not the cause of this, it is rather one of the instruments used in speeding up the change. Some libraries, however, especially the smaller ones, find that the collecting of statistical data steals valuable time from the "real" library work, and this view has been promoted, accompanied by groans and protests.

The first step in harmonizing was to establish a three-part survey for each of the five countries:

1) A description of the overall design of its research library organisation. An important part of this was a description of the interrelationships between university libraries, faculty libraries and university institute libraries, as there were great differences both among the countries and among universities of one country. 2) A survey of the number of libraries actually reporting statistical data, compared to the total number of existing libraries in each of the four categories of ISO 2789. 3) A comparative survey of the data collected and published according to the national rules then in use. This being done, the major problem areas were described. They can be summarised as follows:

A) The type and number of libraries to be included in each library category, so that they are comparable. B) The categorisation of the staff, since their educational backgrounds differ from country to country. C) Consensus on the categories of statistical data to be included in a multi-national statistical yearbook. D) Consensus on the exact definition of these categories.

The second step was to resolve these problems and establish an operational basis for the collection of data. An outline of the decisions reached concerning the four items A) to D) is given in the following.

A. The two main problems regarding type and number of libraries were whether there should be a lower size limit for a library to be included, and whether it would be possible to obtain sufficient data from the many small and often only partly staffed libraries of university institutes. The first problem reflects differences of library structure in the countries involved. Although there was agreement that a lower limit measured by the size of staff was necessary (except for university institute libraries), it was impossible to agree on whether that number should be one full-time-equivalent or higher. The compromise reached was that decision on which libraries to include should be taken at the national level, and that only the number of the remaining very small libraries should be stated, to give an idea of the entire population. For university institute libraries it was agreed that only a very limited set of data should be asked for, namely: the holdings in linear metres; the number of periodicals, the annual additions in volumes; the magnitude of the staff; and the gross annual expenditure. With such a reduced data set, these libraries hopefully would find the time to prepare and submit an answer. In Denmark a side effect has been that other small libraries that previously had not reported at all now want to submit only the limited set of data. In Norway, where many institute libraries have been reporting the full set they want to continue doing so. Habits are hard to change.

B. The categories of staff in the five countries are difficult to compare becaucse the educa-

tional systems are different. For instance in Sweden and Finland there are no formal differences between librarians and persons with high academic degrees, as is the case in Denmark and Norway. It was, however, felt necessary to group the staff in a way that each country could accept. The categories were thus for statistical purposes defined to be of equal content, even if that created inconsequenses such as placing a librarian in the first category in Sweden and in the second in Denmark. The ensuing three categories were defined but not named, as the names would have to be different from country to country. An example is the definition of the category of the highest educational level:

Forskningsbibliotekarer (literally: research librarians) in Denmark

Bibliotekarier och dokumentalister (literally: librarians and documentalists) in Sweden

Universitetsutdanning af lavere/høyere grad (literally: university education of higher/lower degree) in Norway

Kirjastonholtajat ja informatikoot. Muut korkeakoulutukinnon suorittaneet (literally: librarians and information specialists. Other staff with higher education) in Finland

Bókasafnsfræðingar, bókaverðir með háskólapróf (aðrir en bókasafnsfræðingar) (literally: library scientists, librarians with university degree (other than library scientists) in Iceland

In the common Nordic statistics the staff is divided into three categories. The categorisation of staff is different from that of ISO 2789, which may suit other countries but is not of much use in the Nordic countries.

C. The categories of data mainly follow the revised ISO 2789. Exclusions of some data are due to non-applicability or non-use of subdivisions. Such an exclusion or non-use does not imply that these data cannot be collected (and submitted to UNESCO) by the individual countries. It only means that these data will not be published on the Nordic level. There are also additions, especially concerning information services. Such data are requested on: the number of on-line searches; the number of SDI-profiles; the number of documents abstracted to international data bases; the incomes of the library from sale of publications, consultancy work, information retrieval etc. The following definition of an on-line search was agreed upon:

> "An on-line search is for the purpose of this statistics a search restricted by subject, in one or more data bases, in one or more data base systems, made by the library for a user. There is no distinction made between bibliographic data bases, factual data bases and full text data bases. Searches in the library's own catalogue base, or in data bases that contain the library's own catalogue records, are not counted."

This definition is very restrictive as it excludes all searches in data bases containing data on the library's own holdings. It was deemed necessary to keep the distinction between the use of an on-line catalogue and the use of a data base for documentation purposes. Unless they are distinguished, almost any use of a data terminal will soon become an on-line search.

The overall result of considerations of this type was the drawing up of a Nordic Master Questionnaire to be used in the production of the national questionnaires. These national questionnaires must not differ from the M.Q. in anything but language, typography, and inclusion of extra questions on the national level.

D. Finally, there had to be agreement on how the different types of data were to be under-

stood and the corresponding items counted. The basis had to be the ISO definitions. These definitions were adhered to, but they were considered to be too general to be of much use by the many librarians responsible for data collection. Therefore, an interpretation of the definitions was made together with examples where appropriate. The resulting 19-page document was named a "Guide to the Master Questionnaire".

The Guide begins with definitions of a library and an administrative unit and remarks on the data collection period. It continues with definitions and examples of the units to be counted: linear metres; physical units; volumes; title; currency unit; full-time equivalent; on-line search (i.e. the one given above). The rest of the Guide is a detailed analysis of the different items to be counted. An example will show the difference of levels between ISO 2789 and the Nordic Guide. The ISO definition of "physical unit" is as follows:

> "physical unit: single document unit distinguished from other single units by a separate binding, encasement, or other technical device. NOTE: Unbound serials should receive the same considerations as bound serials in respect of physical volume."

In the Nordic interpretation, this is expanded to:

> "A physical unit is a single library document, separated from other physical units by binding, encasement, or other similar technical devices. A physical unit is also normally equal to the unit in which the library material can be given on loan.
>
> As physical units are thus counted the number of volumes, cases, cassettes, spools, reels, boxes, covers for holding microfiche, single microfiche, single sheets etc, such as they are or will be placed on the shelves or in other relevant furniture.
>
> Unbound issues of periodicals are not counted as separate physical units, but are counted as if they were bound according to the library's normal rules for the volume size of a bound periodical.
>
> Ephemera, pamphlets etc. that are not given a separate cataloguing are not treated as separate volumes and are counted only in linear metres, and are treated as a special sub-category.
>
> *A five-volume work is five physical units. Two books, catalogued separately, but bound into a single volume, is one physical unit.*
>
> *Six microfiche are counted as six physical units if they are placed separately (e.g. in a drawer) and can be used or held on loan separately, but as one physical unit if they are kept together in a cover or a box.*
>
> *Orchestra music consisting of one set of parts in one box and one score volume, is two physical units. One sheet of music that has been catalogued separately is one physical unit if it is placed separately on the shelf. If it is placed together with other sheets of music in a case it is a part of the physical unit "case", however.*
>
> *Twenty map sheets, put into three folded paper covers in one drawer is twenty physical units.*
>
> *Twenty pamphlets in a box is one physical unit. One hundred standards (patents, sheets of music, etc) in one box is one physical unit. If the pamphlets are not catalogued separately, but treated as ephemera – see the paragraph on Books and Serials – they are, however, only counted in linear metres.*
>
> *Additional copies are counted as separate physical units, this applies for instance also to microfilm of different polarities."*

The included examples, in italics, are not meant to be exhaustive, but to indicate the philosophy behind the interpretation.

Some definitions are essentially the same as in the ISO standard. Nothing has for instance

been added to the definition of a microform. But usually one or two sentences of explanation were considered necessary. An example is that of "collection", which in the ISO standard is defined as "all documents provided by a library for its users", and in the "Guide to the M.Q." is expanded to:

> "all documents provided by a library for its users. In the collection are also included documents that have been received by the library, but have not been processed. Documents having clauses that restrict or temporarily prevent their use are also included"

The Nordic work could not have been done without the international agreement that lies behind an International Standard. The same data can now be used for the national, Nordic and International, i.e. UNESCO statistics, and the libraries only have to reply once. But this is only possible when a common, detailed description of how the ISO standard is to be understood and used, prepared for a great number of different libraries, is issued. This can be done in the form of a national standard based on the ISO standard, or it can be done on a multinational or regional scale, as the Nordic example demonstrates. It is to be hoped that the Nordic effort may inspire other countries to do something similar.

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Training for audiovisual Archivists and Librarians

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Abstract
Perhaps the most important problem facing educators of future audiovisual archivists and librarians is the lack of international standards for description and indexing of audiovisual documentaiton. A brief description is given of audiovisual training offered at three Canadian library schools, those at the University of Toronto, McGill University, and the *Université de Montréal.* Issues in curriculum development are discussed, and the urgency of this is emphasized. Some of the complexities of storage and retrieval systems for moving image and sound documents vs those for still image documents are explained. Preservation issues are discussed briefly, and differences between preservation of paper documents vs audiovisual documents are stressed. New audiovisual technologies constantly arriving on the scene point to the need for educators to keep informed of developments in this area. Suggestions for improving audiovisual education are offered.

A number of serious problems confront educators of future audiovisual librarians and archivists. Perhaps the most important issue in providing education for future custodians of audiovisual documents in libraries and archives is the lack of international standards and widespread practices in treating this kind of material. Written documentation has a long history. Methods for managing it have evolved over the ages, but it is only in recent decades that any international standards have been developed for describing and controlling bibliographic materials. Since audiovisual documentation is much younger – for all practical purposes dating from the twentieth century – it is not surprising that methods for managing it have not yet been standardized. The question for educators in this area is this: what exactly are we to teach?

The importance of audiovisual documents is increasing, and archival collections of images and sound are extremely valuable for their immediacy and close simulation of reality. Still, they do not generally enjoy high status in library and archive collections (1, 2), and are often considered inferior to text documents, or useful only in accompanying text documents. Since Canada is considered a leader in the management of nonbook documentation (3, 4), an overview of education in this area in Canadian library schools may be useful in providing some guidance for curriculum development.

All seven Canadian library schools offer a master's degree in library and/or information science. In a general way, each offers at least some graduate education related to the question of archiving and preserving audiovisual materials, either through courses in non-print media, communications or information media, audiovisual materials, or archives and records management courses. In this paper we will describe briefly what is being taught in this area at three of these library schools, those at the University of Toronto, McGill University, and the Université de Montréal.

University of Toronto, Faculty of Library and Information Science
In the audiovisual materials course at the University of Toronto's library school the emphasis is on collection development and use of audiovisual materials in libraries. Students are made aware of preservation issues concerning these materials, and there is reference to important Canadian collections of these materials. Still pictures as well as film and video materials are discussed as research resources.

A section on audiovisual archives is a component of an archives course offered at the same school. The emphasis of the course is on preservation, both as a laboratory activity and as a management activity. The value of audiovisual documents as records and documents is emphasized, and there is discussion of how this documentation differs from text documentation. Descriptive practices for audiovisual materials are compared with practices for text-based materials.

In addition, the school has an impressive amount of multi-media equipment, including a darkroom, film and video cameras, and editing equipment. Interested students may make use of this equipment to learn production techniques and techniques for compiling materials for archival storage.

McGill University, Graduate School of Library and Information Studies
At McGill University, the instructor of the audiovisual course is the chief librarian at the National Film Board of Canada. The objectives of this course include:

- to promote an understanding of the role of nonprint media in society and the implications of this phenomenon for the practice of librarianship;
- to develop an awareness of the various types of audiovisual media and the equipment or technologies required to use them;
- to develop a thorough understanding of the principles and methodologies required in the planning and management of audiovisual library services;
- to develop an awareness of the role of audiovisual materials as resources in various types of libraries.

The course includes sessions on technology and media formats, discussion with producers of audiovisual documents, and discussion with people who manage audiovisual collections of cataloguing and subject access. In addition there are visits to media libraries and to the National Film Board where students have the opportunity to discuss technical issues with librarians and archivists responsible for the collections.

Université de Montréal, École de bibliothéconomie et des sciences de l'information
This school offers a master's programme in library and information science, and also offers an archives certificate. In the library and information science programme, there is a course in audiovisual materials which includes a section on preservation of these materials. In addition, there are visits to various cultural institutions housing audiovisual collections, and these are organized by the students themselves. Several practitioners from collections in the area are invited for discussion of issues concerning nonbook documentation.

The National Film Board is the most important Canadian user of the PRECIS indexing system. Because of this, the Board is used as an example for teaching PRECIS indexing in a course in subject access to documentation. This section of the course includes a visit to the

National Film Board, during which students apply PRECIS indexing techniques to sample audiovisual documents.

In the archives certificate programme, a course in preventive conservation includes a section on audiovisual materials. An archivist from the Moving Image and Sound Archives division of the National Archives of Canada is invited to discuss issues in archiving audiovisual documents. Students are encouraged to learn production techniques as a way of developing skills needed for work in audiovisual archives.

As we have seen in the brief overview of activites at these schools, there are close links between teaching activites and audiovisual archives. The National Film Board of Canada has its operational headquarters in Montreal and is responsible for managing the FORMAT database of all Canadian film and video production. In addition, the National Film Board has a very large archive of stock footage, and an important music and sound effects library. Both library schools in Montreal have taken advantage of the presence of this institution to forge links which are valuable in the education of future librarians and archivists. Other important audiovisual collections in the city include the Cinémathèque québécoise, Radio-Canada, Radio-Québec, and the audiovisual collections of the public library system. The national collections in Ottawa are only 200 km away, and they have been the focus of much work in audiovisual archiving and management. In the course of a two-year programme at library school, students are usually given several opportunities to visit these collections.

Issues in curriculum development

There is urgency to developing appropriate courses in the management of audiovisual documents because a large mass of documentation has now accumulated. When unable to provide detailed access to paper-based documentation, archives have traditionally reacted by providing only very broad access, with only a descriptive overview of an existing *fonds*. Although such methods are not ideal in audiovisual archives, they may be adequate for some kinds of scholarly research, such as that based on chronological considerations or on the work of one person, especially when the researcher needs to view the entire collection. However, requests for information in connection with film and video production, which represents far greater use of audiovisual archives, are usually specific. Thus the need to describe audiovisual documentation in detail is critical. When the mass of documentation is small, inadequate methods can be tolerated because it is still possible to retrieve by browsing the entire collection. However, since the Second World War such a large mass of audiovisual documentation has developed that it is no longer possible to make do with haphazard storage and retrieval methods.

An important problem in this regard is that librarians and archivists have little experience in organizing audiovisual materials for retrieval. There is widespread opinion in the literature that book classification and subject headings do not adapt well to image collections (5, 6, 7, 8). Yet this is the route librarians have taken because they lack knowledge of more appropriate methods. The need is evident for developing adequate models and standards for cataloguing and indexing individual shots, scenes, or sequences of film and video products, as well as for providing adequate description and detailed indexing of still images.

Most systems in use today have been developed to meet the needs of a particular collection. Because of the lack of standardization in this area, it is difficult to synthesize general principles to teach in audiovisual courses. Since audiovisual documents have such fundamentally different characteristics from text documents, and since there is such a broad range of types, formats, subject matter, and uses of audiovisual collections, it is even questionable whether standards are possible for this kind of material. Perhaps general guidelines are the best we can hope for. The surrogation of audiovisual documents and provision for subject access to

them is an area which is ripe for research, and clearly the need is urgent.

Since consulting audiovisual materials takes place in time, a level of complexity is added to the problem. Because viewing time or listening time is required, it is important to provide description of this material which is adequate and useful for searchers. It is often tempting to group still pictures and slide documents with audiovisual documents for purposes of discussion, but there are fundamental differences between the two kinds. Referring to images in illuminated manuscripts, Ohlgren argues that

> verbal language is inadequate for expressing visual language. Words are only crude approximations for images. This problem will not be resolved until it is feasible to store and to retrieve the images themselves in the data base... This approach would obviate the need for the verbal abstract as the intermediary between index entry and image (9).

Videodisc technology has made Ohlgren's wish a reality. However in the case of moving and sound documents there are other considerations. The investment in viewing or listening time has to be weighed against the information content of a text synopsis. For example, if twenty or thirty shots are retrieved in a search, it may well take an hour to view the material even if each shot could be retrieved instantly, which is not yet technically possible for large collections of moving image documents. Viewing a still image directly seems obviously superior to reading a description of it, but in the case of moving images, scanning the text of visual synopses provides important time savings because carefully crafted descriptions supply enough information to decide which shots can be eliminated immediately. Five minutes are probably sufficient to scan twenty or thirty text synopses. In contrast, it may require several hours to retrieve the corresponding material, mount it on machines, and view it. From this we can see that even if it were possible to view moving images instantly a text synopsis would still be necessary for this kind of documentation.

In addition, text surrogates can provide important information not available from the image, such as the names of people speaking on camera, the location where the action is taking place, identification of buildings and unfamiliar objects, and so on. Ohlgren is right about the advantages of direct access to still images; however, moving image documents need a good text description if adequate retrieval is to occur. Even with still images a text description or a caption is sometimes necessary to identify the subject matter, as in the case of microscopic shots, close-up details of objects, and photographs taken from off the planet (10).

The implications of these problems for educators are staggering. Until standardized methods of description and indexing are developed, what educators in this area must do is to seek out collections that are well organized, learn the organizing principles used in their development as well as the methodology used for running them, and use these collections as examples for their students. Even when standards are made available they will not be suitable for some collections with very specialized material or very particular user needs. We must learn to live with the fact that while technology can provide a great deal of assistance in developing powerful storage and retrieval systems, it cannot solve the intellectual problems for us. We can look forward to better management of audiovisual documents, but must not expect perfection until we can work out the intellectual problems satisfactorily. This is not about to happen.

Preservation issues

Since paper documents form the bulk of most archival collections, most preservation efforts have been geared to these. Just as the description and indexing of audiovisual documents

pose a particular set of problems, so it is with the preservation aspects. Different supports have different ideal storage conditions of temperature and humidity, so in a primary division audiovisual documents should be stored separately from paper documents. Within the category of audiovisual documents there are different sets of recommended storage conditions for the different types of supports. In this context, mixed collections are usually problematic, partly because in practice many archives are unable to support several sets of storage conditions. This causes a tremendous amout of difficulty for educators in this area since in many cases there can be no practical application of the pedagogical material. What can be done is to provide students with information about acceptable guidelines for the different types of document supports, and try to instill in them the importance of lobbying constantly administrators and governments for funding to enable proper storage conditions for these valuable documents.

With paper documents, all but very severely damaged (i.e. destroyed by fire) documents can be restored if enough resources are available. Even without restoration, it is usually possible to recuperate the information content of the document. With documents which require a machine for interpretation, however, the situation is not so simple. Damage to the physical support of these documents often means the information content is lost or damaged. This is especially true of computer-stored information. Mallinson (11) points out that for computer-based information the problem is less with the support material itself than with maintenance of the machines required to read such documents, and notes that the dizzying rate of technological change in this area is an unsolvable problem for archivists, who cannot be expected to own and maintain all the hardware required to read different computer document formats. Even if they could, manufacturers do not supply technical support once the machines are no longer marketed. Mallinson concludes that for computer-based documents, the only certifiable archival supports are paper and microfilm processed to archival standards. Mallinson's ideas provide important insights into what can be done about the problem of archiving computer-based documents, and the solutions he offers may provide some help to audiovisual archivists. Paper-based storage is of little help in this regard, but video documents can be converted to newer tape formats for storage until the problems of optical disk and videodisc deterioration have been solved, or ways are found to store digitized image and sound informaiton cheaply and efficiently. Fortunately technological developments in audiovisual hardware are a little more stable than developments in computer hardware. While it is true that audiovisual formats abound, they tend to last longer because they are so dependent for survival on the mass market. But it would be foolish to think we can breathe easily because of this. Competition is keen and research is constantly being carried out. Exciting new audiovisual technologies such as high definition television (HDTV), super-VHS (SVHS) and Sony Video 8 will soon require re-thinking of methods used in audiovisual archives. In addition, multi-media computer integration of technologies will soon be a source of worry and perhaps of some kind of salvation for audiovisual archivists. This technology may at last allow seeing moving images in a window of the same screen in which the user studies the database housing information about the images (12). Because of these rapid changes educators of future audiovisual archivists must constantly keep abreast of the technology, and integrate discussion of it into their courses in order to transmit this important information to their students.

Improving audiovisual education

It is clear that much more research into description standards and organization of information for retrieval is needed. What standards have been developed should be taught and their use encouraged, as should ongoing work in this area. Meanwhile, much can be done to help improve access to audiovisual collections. Clear and systematic instruction in the principles

of organization and retrieval is important. The essential differences between text-based documents and audiovisual documents need to be emphasized, as well as the role machines play in reading audiovisual documents. The history and development of film, video, and sound technology must be assimilated, as well as a solid understanding of future directions as far as they can be known. The importance of keeping abreast of innovations, important in all professions, is perhaps especially important in this area, and students need to understand this. Information-sharing mechanisms should be fostered and participation in them encouraged.

Preservation issues are extremely important for audiovisual materials. The distinction needs to be emphasized between preserving the original physical support material, as with film (except for nitrate film), and preserving the information content, as with video images. In general, this has to do with differences between images which are projected or which can be seen with the naked eye, and images and sounds which are stored in coded form and which require machine decoding in order to be viewed and heard. Issues in the transfer of visual and sound information using the same support and between supports must be discussed, e.g. from film to film, from tape to tape, or from film to videotape to laser disc. Special handling and cleaning techniques for the different audiovisual supports are important and must become second nature to audiovisual archivists and librarians. Treatment of damaged materials, e.g. by water or fire, is very difficult and highly specialized, but students must be made aware of where help can be obtained if needed. In all this, emphasis must be an preventive conservation, by far the most reasonable and economical way to manage these collections.

Institutions with important collections should take a leading role in providing educational services to library and archives programmes in universities and other educational institutions. This is especially true if they have good storage and retrieval systems for them. In providing education in this area, the distinction needs to be kept in mind between general principles of archiving, preservation, intellectual control, etc., and conditions which apply in specific archives. Almost all are so specialised that general training is not sufficient. Specific on-the-job training is required. For this reason academics must work closely with practitioners in order to provide useful, wellbalanced training in this field. In educational institutions, practitioners should be invited to teach courses in specific areas, and to give guest lectures in more theoretical courses.

How all this can be accomplished is a matter for the imagination. In a general way, classroom training is probably more appropriate for the basic information, and home study, cassette information packages, summer workshops, and brainstorming sessions more appropriate for updating knowledge. Educational institutions and large audiovisual archives might work out internship programmes together, perhaps concentrating on the post-production skills required for this kind of work. Institutions with production facilities might consider making audiovisual documents for disseminating important information about the archival aspects of this documentation. Video cassette players are omnipresent these days, and distribution of such documents by mail for home study is uncomplicated. Educational television is another possible resource that might be tapped for offering courses via cable or satellite television. Short workshops, summer courses, and small, specific projects are other possible routes to take. Since resources are limited and costs are high, full advantage should be taken of cheap, widely available technology. In addition, good and imaginative use should be made of audiovisual archives in local cultural institutions. It is in everyone's interest to collaborate and to share resources, and joint projects with specific goals to accomplish should be undertaken between educational institutions and audiovisual collections.

Continuing education programmes can be very helpful to practitioners. Local professionals with expertise in specific areas can be recruited to share their knowledge with others who need it. Recurring problems which are relatively simple to solve might be a useful focus for

these, such as cleaning techniques, tape re-winding programmes, or user training. Topics for more in-depth workshops might include selection criteria for acquisition, indexing issues and techniques, or preservation issues specific to one support. Another useful division of topics might be film-based documents, tape-based documents, and disc-based documents. Forums for information exchange are also useful, such as the recent (1990 04 30–1990 05 03) four-day international symposium on archiving audiovisual documents entitled *Documents that move and speak* at the National Archives of Canada. More activities of this nature would no doubt be extremely helpful in providing ongoing education.

It seems clear that some kind of basic professional programme should be developed, perhaps lasting one or two years and including a practicum. Educational institutions would provide some kind of certification, and a pool of expertise of audiovisual archivists and librarians could be drawn upon for help in curriculum development. Close cooperation among institutions is required to ensure that appropriate training is provided and maintained. In order convince educational institutions of the importance of such a programme, however, educators, archivists, and librarians used to thinking primarily in terms of text-based documentation must educate themselves concerning the increasing importance of audiovisual documents in modern society.

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